The Adoption of Information Technology in Self-Managing Service Teams

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This article examines antecedents and consequences of the adoption level of standardized information technology (IT) versus customized IT in self-managing teams (SMTs) in a financial services institution. Linkages between specified antecedents and the adoption levels of standardized and customized IT were investigated using data collected from bank employees and in-company databases. The authors find positive individual-level effects of tolerance of self-management, ease of use, and innovativeness on the adoption level of standardized IT and positive individual-level effects of tolerance of self-management and perceived usefulness on the adoption level of customized IT. These findings suggest that discriminating between different types of IT creates a better understanding of IT adoption in SMTs. A similar investigation of the IT adoption-service performance relationships shows that the adoption level of customized IT rather than of standardized IT has a crucial impact on service performance both in terms of customer satisfaction and productivity.

Keywords: *IT adoption; self-managing service teams; service performance; customer satisfaction*

The adoption of information technology (IT) across many service industries is rapidly changing the nature of the service delivery process, necessitating employees and encouraging customers to interact with technology, either as a substitute or complement to face-to-face interactions (Parasuraman 2000). It has been argued that the use of IT enhances the performance of service employees, both in terms of efficiency and effectiveness, by enabling customization and flexibility in their encounters with customers (Bitner, Brown, and Meuter 2000). Thus far, the focus in the emerging body of (self-)service technology research has been on the technology-customer linkage (Dabholkar and Bagozzi 2002; Meuter et al. 2000), whereas the technology-employee interface has primarily aimed at internal operations, as opposed to frontline support technologies in boundary-spanning processes (Parasuraman and Grewal 2000). Despite the wide-scale implementation of IT in services, there has been little research-based guidance regarding critical success factors in adoption and customer-contact employee usage, as well as the impact on service performance parameters. From the information systems literature (e.g., Davis, Bagozzi, and Warshaw 1989; DeLone and McLean 1992) and from research on the customer-technology interface, there is accumulating empirical evidence that both personal (e.g., innovativeness) and IT (e.g., perceived ease of use) characteristics may explain individual adoption variance.

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However, it has also been argued that adoption of IT by boundary spanners may also depend on the way in which the organization is structured (Ives and Olson 1984; Leonard-Barton and Deschamps 1988; Lucas 1978). Although IT has been viewed as an enabler for contact employees to customize their service delivery, it has also been argued that this is highly contingent on "the use of flexible processes and organizational structures" (Hart 1996, p. 13). Rathnam, Mahajan, and Whinston (1995) argued that although IT implementation has significantly decreased time, space, and information distances by facilitating the coordination of the total service delivery process, contact employees also require the authority and autonomy to deal effectively with sophisticated technological tools in their encounters with customers (Parasuraman 2000). If, for instance, IT leads to more efficient service recovery actions of contact personnel by equipping them with sufficient information, the use of technology will be contingent on the empowerment to act in accordance with this information (Bitner, Brown, and Meuter 2000). An increasing number of service firms (e.g., Eastman Chemical Company, Xerox, and Sun Microsystems), therefore, have complemented the IT infusion of service delivery with the introduction of self-managing teams (SMTs). Delegating the collective responsibility for service delivery to SMTs may be an important condition for enhancing the degree of adoption of IT by employees, in addition to personal and IT characteristics. The general objective of this article is to empirically assess this assumption.

Our article has a multidisciplinary focus, as it integrates the literature on services management, IT adoption, and organizational behavior and is structured as follows. First, we discuss the role of IT adoption in SMTs with regard to service performance and develop a conceptual model that identifies individual-level and aggregate-level antecedents and consequences of the adoption level IT. Next, we empirically examine whether IT adoption level is an important differentiating factor between SMTs with respect to key performance indicators in a financial services setting. Furthermore, we test multilevel regression models to determine which antecedents affect IT adoption by SMTs. We conclude the article by discussing our findings as well as their theoretical and managerial implications.

ADOPTION LEVEL OF IT IN SERVICES

The concept of IT adoption or acceptance has long been regarded as a dichotomous variable in studies on the adoption of innovations (Westphal, Gulati, and Shortell 1997). In an attempt to capture more accurately the considerable variation in IT adoption by employees, more differentiated criteria of user adoption, such as "frequency of times the technology system is used" or "the number of different technology system applications used," have been developed to measure the individual's level of adoption rather than individual's choice to adopt IT or not (Davis 1989; Schillewaert et al. 2000). Instead of considering these indicators simultaneously, various studies base their conceptualization of adoption on single indicators (Schillewaert et al. 2000) and/or do not distinguish between different types of IT. Nevertheless, discriminating different types of IT is crucial to measure adequately the current IT adoption practice characteristic of boundary-spanning service teams. This IT adoption process is complex, because it involves both front- and back-office activities. Specifically, boundary-spanning service technologies are intended (a) to enhance the efficiency and effectiveness of employee-customer encounters and (b) to facilitate the coordination among employees within and between teams. Second, although in hierarchically structured organizations innovations are usually implemented by top management (Leonard-Barton and Deschamps 1988) or by IT specialists (Janz et al. 1997), nowadays this innovation authority has been delegated to a relatively large degree to SMTs in many service organizations (Morrison, Roberts, and Von Hippel 2000). Consequently, these firms are facing a dispersed IT practice in which standardized (i.e., company-wide) as well as customized IT (i.e., service-specific) applications have been implemented.

Several studies in the services marketing literature have addressed customization versus standardization of services with respect to major service characteristics such as diversity of customer demand, degree of customer participation, and intensity of employee-customer contact (e.g., Larsson and Bowen 1989; Verma 2000). The customization of service technology is inherently implied in the definition of service customization. For the aim of this study, it is important to make a distinction between standardized and customized applications of service-supporting technology. On one hand, the use of centralized company-wide standard IT applications facilitates economies of scale and the coordination of the total service delivery process, leading to significant decreases in time, space, and information distances (DeSanctis and Jackson 1994; Rathnam, Mahajan, and Whinston 1995).

On the other hand, customer service requirements, standards, and procedures vary substantially across services types and customers. This means that individual service providers must also adopt additional service-supporting technology to optimally fit individual customer requirements (Mulligan 1999). SMTs may use their authority and budgets to adopt additional technological tools to improve their performance in their encounters with customers (Janz et al. 1997). The very characteristics of services urge contact employees to use complementary technology to deliver service that better meets the needs and demands of their customers. The adoption of customized technologies may play a crucial role in the ability of companies to adjust adequately their services to customers' diversified requests and is, therefore, considered as a crucial competitive edge (Karimi, Somers, and Gupta 2001). Hence, there seems to be a rationale for making a distinction between the adoption of standardized and customized IT in relation to SMTs in service organizations.

ADOPTION LEVEL OF IT AND SERVICE PERFORMANCE

Technology support in service delivery is not an end but a means to enhance service performance by boundary-spanning teams. In the marketing literature, service performance has recently been posited as a phenomenon consisting of two related but distinct aspects. On one hand, it pertains to process-oriented, subjective measures that are often based on customer satisfaction and customer perceptions of quality. On the other hand, service performance involves objectively verifiable and quantifiable service outcomes, which often concern service productivity measures such as volume of services delivered. Quinn (1996) argued that flexibility in the delivery of services is one "of the most important quality gains technology produces" (p. 74). Large amounts of information that could not be remembered, saved, or organized previously are now easily accessible for employees via high-end IT (e.g., customer relationship management [CRM] software). Through the use of IT, firms are able to effectively provide mass-production services in a personalized way to meet diversified customer expectations. Harvey and Filiatrault (1991) demonstrated that IT adoption in the banking industry may speed up client queries and implement client requests and ultimately results in more favorable service quality evaluations. The use of centralized company-wide standard IT applications facilitates economies of scale and the coordination among employees within and across teams throughout the organization and enhances consistence in responding to customer requests (DeSanctis and Jackson 1994; Mulligan 1999). Complementary customized IT applications enable team members to provide quicker, more detailed answers to customers' questions, resulting in better meeting customer expectations and higher productivity rates. Hence, we hypothesize the following:

Hypothesis 1: SMTs with relatively higher adoption levels of standardized IT (Hypothesis 1a) and customized IT (Hypothesis 1b) perform significantly better in terms of customer satisfaction scores than SMTs with lower adoption levels.

Hypothesis 2: SMTs with relatively higher adoption levels of standardized IT (Hypothesis 2a) and customized IT (Hypothesis 2b) perform significantly better in terms of productivity parameters than SMTs with lower adoption levels.

Mulligan (1999) argued that combining different service tasks with differential IT competence increases company performance. This implies that a positive interaction exists between the adoption level of customized and standardized IT. The exclusive application of IT to highly standardized tasks makes all knowledge requirements redundant, whereas applying IT to tasks with limited standardization emphasizes the importance of content-based knowledge. As such, a midcontinuum perspective has been advanced, which aims at know-how to accomplish automated routine tasks, as well as IT, aimed at content-based knowledge about specific service procedures to create competitive advantage (Davenport 1997). Furthermore, DeSanctis and Jackson (1994) emphasized the importance of a hybrid IT management approach, where some IT resources (e.g., telecommunications, shared customer databases, large-scale computer operations) are managed company-wide, whereas other IT resources are managed locally (e.g., office computing and special applications development). Such hybrid forms of organizing IT seem to be a reasonable strategy for balancing between the advantages of standardized IT and customized IT. As such, the combined use of different types of IT has an incremental effect on firm performance. Hence, we hypothesize the following:

Hypothesis 3: SMTs with relatively higher adoption levels of both standardized and customized IT will perform significantly better in terms of customer satisfaction scores than SMTs that are characterized by relatively lower adoption levels of one or both types of technology.

Hypothesis 4: SMTs with relatively higher adoption levels of both standardized and customized IT will perform significantly better in terms of productivity parameters than SMTs that are characterized by relatively lower adoption levels of one or both types of technology.

ANTECEDENTS OF THE ADOPTION LEVEL OF IT IN SMTs

As IT adoption is expected to be a key driver of service performance, it seems relevant to investigate its determinants. Following previous work on technology use, three focal categories of antecedents can be distinguished. First of all, studies on technology adoption have identified characteristics of the organizational context as a major determinant (DeCanio, Dibble, and Amir-Atefi 2000; Ives and Olson 1984; Leonard-Barton and Deschamps 1988; Schillewaert et al. 2000). This has led DeCanio, Dibble, and Amir-Atefi (2000) to conclude that "organizational structure is indeed a crucial element in the diffusion of technological innovations" (p. 1297). A second group of antecedents pertains to characteristics of the technology itself (as perceived by its users). For example, perceived ease of use and usefulness have been identified as critical factors of IT adoption in previous research (e.g., Davis 1989; Venkatesh and Davis 2000). Finally, recent research has identified adopter characteristics as a third crucial category of determinants of IT adoption (e.g., Dabholkar and Bagozzi 2002; Parasuraman 2000). In the remainder of this section, we specify the relationship of predictor variables pertaining to these three categories in relation to IT adoption by SMTs as a criterion variable.

Organizational Characteristics

Tolerance of self-management. Tolerance of self-management (tolerance) refers to a general organizational orientation or climate in which employees have the discretion to make day-to-day decisions about job-related activities (cf. Bowen and Lawler 1995). In a work group context, tolerance refers to the fact whether team group members are empowered to make task- and investment-related decisions and accept the responsibility for the outcomes of these decisions (Campion, Medsker, and Higgs 1993). In general, delegating authority to teams of employees allows for greater flexibility and adaptability in performing various service activities through better problem solving, closer employee cooperation, and more efficient knowledge exchange. The relationship between empowerment and IT has led to considerable debate in the literature. On one hand, it has been argued that higher levels of discretion imply that individuals use more IT, whereas others use less IT (e.g., Mick and Fournier 1998; Parasuraman and Colby 2001). On the other hand, a number of studies have conceptually supported and empirically demonstrated a positive relationship between empowerment and the use of technology (e.g., Hitt and Brynjolfsson 1997; Howard and Foster 1999). Indeed, a climate of empowerment provides employees better access to information sources about recent technological developments and innovative service practices. It also leaves employees more room to get acquainted and to experiment with new IT systems and ultimately to determine which tools they prefer (Janz 1999). Self-management in a team context suggests that empowered team members will exchange their novel IT experiences, which will lead to a rapid diffusion of technological innovations (DeCanio, Dibble, and Amir-Atefi 2000). Therefore, it is likely that the more autonomy is granted to SMTs, the more they will make use of their ability to invest in IT to support the service delivery process. Higher levels of autonomy are likely to yield more room for decision making in relation to both types of technology. Accordingly, we hypothesize the following:

> *Hypothesis 5:* There will be a positive effect of tolerance on individual team members' adoption level of standardized IT (Hypothesis 5a) and customized IT (Hypothesis 5b).

Interteam network. A climate of self-management may facilitate flexibility and rapid response to the diversified and changing customer requests by service teams, but it may also act as a hindrance to integration of the team activities and objectives with those of the organization. Too much autonomy may lead to SMTs that develop norms and adopt innovations that are not aligned with innovation objectives set by the organization. Therefore, a number of companies are experimenting with hybrid self-management structures in which SMTs operate within a formalized network or an alliance of interdependent teams, much like partnerships in external markets, such as the airline industry (DeSanctis and Jackson 1994). In this way, teams are granted self-management with respect to some elements of service operations, although they have to adhere to the rules and procedures of a network structure with respect to, for instance, the synchronization of quality goals, database procedures, and human resources policies. Recent studies have argued that such an interteam network structure contributes to team performance (Frambach et al. 1998). Institutionalizing the interdependency between organizational units provides structure to the SMT activities, as it explicates and "internalizes" the content of organizational goals and objectives, while still allowing operational autonomy by SMTs. Networks of SMTs may facilitate the coordination between teams in the case of standard organization-wide innovation projects (Michaels et al. 1996). As such, interteam networks facilitate a sophisticated understanding of how to use standard applications and may act as an information platform with respect to adaptive IT systems that are intended to alleviate specific service operations. Therefore, we hypothesize the following:

> *Hypothesis 6:* There will be a positive effect of the participation of SMTs in interteam networks on individual team members' adoption level of standardized IT (Hypothesis 6a) and customized IT (Hypothesis 6b).

Technology Characteristics

Usefulness. Several studies have demonstrated the positive impact of perceived usefulness on the adoption of IT (e.g., Davis 1989; Teo and King 1996; Venkatesh and Davis 2000). It refers to "the degree to which a person believes that using a particular system would enhance his or her performance" (Davis 1989, p. 320). Usefulness typically denotes an extrinsic motivation factor, that is, the activity is perceived to be an instrument to a desirable end. Employees who perceive technology systems as useful vehicles to achieve desired outcomes are more motivated to use technological innovations. Hence, we hypothesize the following:

Hypothesis 7: There will be a positive effect of usefulness on individual team members' adoption level of standardized IT (Hypothesis 7a) and customized IT (Hypothesis 7b).

Ease of use. Ease of use refers to "the degree to which a person believes that using a particular system is free of effort" (Davis 1989, p. 320). Where usefulness pertains to extrinsic motivation, ease of use involves an intrinsic motivational variable. Specifically, ease of use refers to the degree to which people like to perform an IT task for the sake of the activity (Atkinson and Kydd 1997). By investigating customer attitudes toward service innovations, many recent studies have demonstrated that the adoption of IT increases when people expect the use of a system to be user-friendly (Davis, Bagozzi, and Warshaw 1989; Teo and King 1996; Venkatesh and Davis 2000). When a system is easy to use, it requires less effort on the part of the users, thereby increasing the chance of adoption and usage (Teo and King 1996). Consequently, we expect that ease of use will have a strong impact on SMT members' intention to use technologies for the purpose of delivering customer service. Therefore, we hypothesize the following:

Hypothesis 8: There will be a positive effect of ease of use on individual team members' adoption level of standardized IT (Hypothesis 8a) and customized IT (Hypothesis 8b).

User Characteristics

Innovativeness. In the marketing literature, innovativeness has been identified as an important driver of adoption (e.g., Rogers 1995). The term *innovativeness* refers to the degree to which employees are willing to use new concepts, ideas, products, or services and their awareness of the potential of innovations. Contrary to motivational variables like usefulness and ease of use, innovativeness typically reflects a personality characteristic, which is relatively stable and enduring across different types of contexts. As such, it has been conceptualized as a "persisting personal predisposition to innovate" (Schillewaert et al. 2000, p. 8). Frequently, a distinction has been made between general and domain-specific innovativeness, where it has been argued that domain-specific innovativeness is a more powerful predictor of a specific innovation (Schillewaert et al. 2000). Following this line of reasoning, we define the construct as the "SMT member's personal willingness to adopt service IT." Employees who show a highly innovative attitude toward IT are assumed to exhibit more positive beliefs toward using service-supporting technology (Parasuraman 2000). These employees, in turn, have more technology-related experiences and are more competent in handling them. Thus, innovative employees will make more comprehensive use of standard applications and are more likely to engage in additional adaptive IT applications to facilitate services activities. Therefore, we hypothesize the following:

Hypothesis 9: There will be a positive effect of innovativeness on individual SMT members' adoption level of standardized IT (Hypothesis 9a) and customized IT (Hypothesis 9b).

Risk aversion. Risk aversion refers to the undesirable consequences people expect when they use technological innovations. Like innovativeness, risk aversion concerns a user characteristic, which is critical in IT adoption (Pennings and Smidts 2000). The infusion of IT requires extensive adaptation on the part of employees in terms of attending computer training and adjusting to the changing nature of the service activities. As a consequence, many employees feel uncertain about the implementation of complex technologies in the service delivery process (Bitner, Brown, and Meuter 2000). In other words, IT adoption requires a climate of risk taking and experimentation (Kock and McQueen 1998), which implies that perceptions of risk are relevant. Findings of previous studies have already extensively shown that risk-taking behaviors of managers (Nakata and Sivakumar 1996) and risk perceptions of customers toward new types of services and products (e.g., Dabholkar and Bagozzi 2002) have a crucial impact on IT adoption. In the context of SMTs, risk attitudes of employees seem particularly relevant. By delegating authority to employees, they have more freedom and are assumed to decide themselves on how to deal proficiently with customer demands. As a consequence, employees also bear more responsibility and have to take more risks with regard to innovative decisions in complex service situations. These employees, in turn, have more technology-related experiences and are more competent in handling them. Thus, employees with high levels of risk aversion are less likely to comprehensively use standard IT systems and additional adaptive IT applications to facilitate their services activities. Therefore, we hypothesize the following:

Hypothesis 10: There will be a negative effect of risk aversion on individual team members' adoption level of standardized IT (Hypothesis 10a) and customized IT (Hypothesis 10b).

The aforementioned hypotheses are summarized in Figure 1.

REFINEMENT OF THE CONCEPTUAL FRAMEWORK

The choice of the antecedents specified in our conceptual framework is largely founded on previous conceptual and empirical work that proposed the use of individual-level measures when predicting organizational phenomena (e.g., Lincoln and Zeitz 1980). Other researchers state, however, that organizational characteristics can be best analyzed at the group level and emphasize the relevance to consider individual characteristics also at higher levels of analysis (Bliese 2000). The group-level assessments of the antecedents reflect shared team member perceptions of organizational characteristics (i.e., tolerance), technology characteristics (i.e., usefulness and ease of use), and user characteristics (i.e., innovativeness and risk aversion). Social dynamics in work groups may have an important influence on individual team members' perception of surrounding organizational characteristics (e.g., the level of tolerance within the team) as well as on their personal attitudes (e.g., the risk aversion to the use of IT). Each team has its own culture and norms with respect to appropriate performance attitudes and behavior (e.g., shared norms about the desired adoption level of standardized IT), which is reflected by between-group differences (Matthieu and Kohler 1990). These synergetic group-level effects originate from interpersonal processes among team members. Interpersonal processes may be implicit or explicit in nature. In social psychology literature, it has been long contended that human beings in a social context (e.g., a team) strive for higher order needs, as are social presentation needs and needs for cognitive consistency (Festinger 1954; Maslow 1970). These needs drive individual employees to use their cognition and affect to intentionally influence other team members' perceptions and attitudes within the team (e.g., by exhibiting risk aversion toward IT in presence of other colleagues) in order to reach socially acceptable outcomes. Furthermore, interpersonal processes may also affect team members in an implicit way. It has been argued that employees without conscious awareness tend to conform to other colleagues' attitudes and behaviors within the group. This happens through social mechanisms, such as groupthink, vicarious learning, and emotional contagion (e.g., Bandura 1986; Bartel and Saavedra 2000). Findings from previous studies have demonstrated that group-level assessments of variables significantly explain extra variation in individual employee outcomes that is not covered by the individual-level assessments of these variables (Blau 1995; Mathieu and Kohler 1990). These empirical results support the rationale that group-level aggregations of team member perceptions include an extra compositional effect, for which individual team member scores do not account (Bliese 2000; Ostroff 1993). To determine the occurrence of compositional effects, the aggregation of individual-level perceptual measures is needed to test additional cross-level relationships between group-level specifications of the antecedents and individual-level outcomes. Therefore, we posit the following hypotheses:

Hypothesis 11: At the group level of analysis, there will be positive effects of tolerance (Hypothesis 11a), usefulness (Hypothesis 11b), ease of use (Hypothesis 11c), and innovativeness (Hypothesis 11d) and a negative effect of risk aversion (Hypothesis 11e) that account for a significant amount of additional variance in individual team members' adoption level of standardized IT.

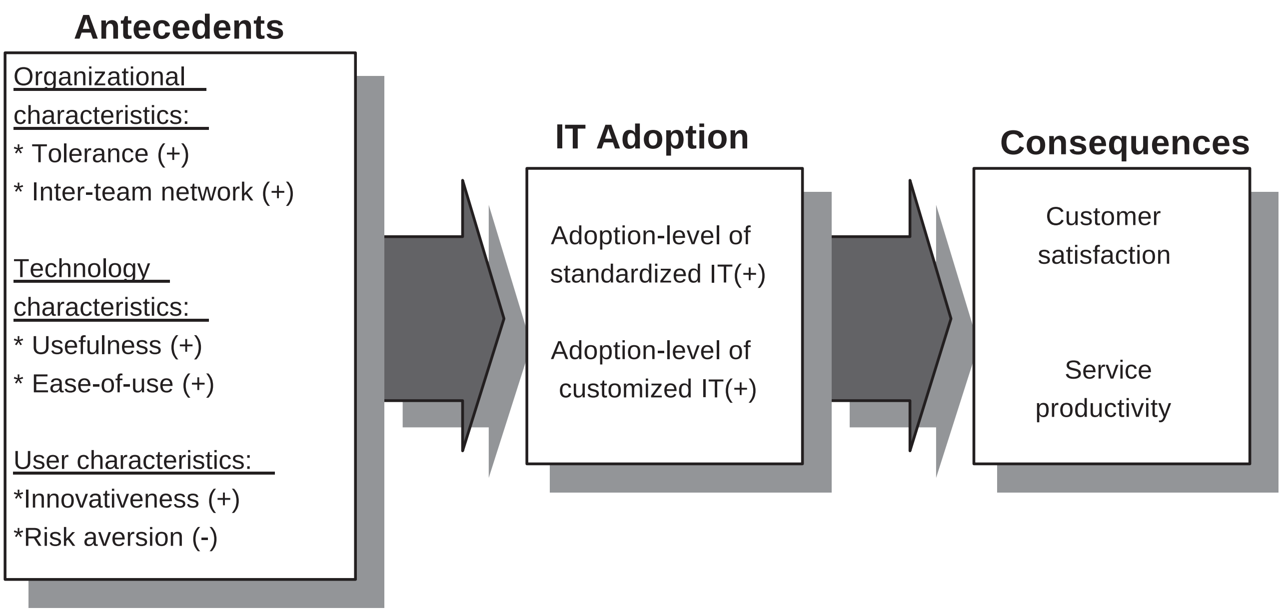
Hypothesis 12: At the group level of analysis, there will be positive effects of tolerance (Hypothesis 12a), usefulness (Hypothesis 12b), ease of use (Hypothesis 12c), and innovativeness (Hypothesis 12d) and a negative effect of risk aversion (Hypothesis 12e) that account for a significant amount of additional variance in individual team members' adoption level of customized IT.

AN EMPIRICAL STUDY

Research Setting

Employees of SMTs of a large European bank, headquartered in Belgium, were surveyed. The bank employs approximately 25,000 employees. It operates both in business and consumer markets and has a widespread branch network, serving many local communities. Traditionally, the branch offices constitute small-scale and often in-home offices staffed by a relatively small number of employees. Within each branch, SMTs of employees are responsible for offering a wide range of financial services, such as investment services, private banking, housing and mortgage services, savings accounts, life insurances, and so on. Specifically, the key activities of the SMTs vary from basic transactions aimed at provision of services in a quick and consistent way to more complex work with the emphasis to meet customers' unique specifications. Approximately half of the SMTs operate within an interteam network. The infusion of IT in service operations by the SMTs is considered to be an important organizational

FIGURE 1
Relationships in the Conceptual Framework



NOTE: IT = information technology.

change process, where the use of standard and customized IT applications is not mandated by the firm management but the SMTs themselves have the discretion to decide to what extent to use them. Therefore, the practical rationale for conducting a survey among employees was to examine the impact of IT adoption rates on SMT service performance. In the next section, we provide further details on the survey.

Sampling and Surveying

Data were collected by means of self-report questionnaires from individual employees organized in SMTs that have an average size of 5.7. Each SMT constitutes a separate branch. In total, 968 mail questionnaires were sent to employees of 170 SMTs. All employee members of the SMT were invited to participate. We ended up with an effective response rate of 44.8% (= 434 respondents). The following sample profile emerges. To begin with, from the data, it appears that 71.0% of the employees are younger than 40 years. With respect to bank and computer training, the majority of the respondents have attended less than 10 weeks of bank training (87.3%) and less than 10 days of computer training courses (88.9%). Finally, at least 2 respondents were effectively surveyed per team.

Measurement Issues

All scale items of the employee survey were measured with a 7-point scale, ranging from *strongly disagree* (1) to *strongly agree* (7), largely on the basis of validated scales. The operationalization of tolerance was largely based on an instrument from Cook et al. (1981). The usefulness and ease-of-use scales were measured using a scale designed by Davis (1989). Innovativeness and risk aversion were measured using items from a scale developed by Grewal, Mehta, and Kardes (2000).

We employed two techniques to test the factor structure and item loadings of the scale constructs. We initially examined coefficient alphas and the factor structure (through principal component analysis) for all the scale items simultaneously. A five-factor structure was achieved with items loading on the assumed dimensions. In addition, we performed a confirmatory factor analysis (CFA) and used LISREL to assess the critical measurement properties of the scales. The fit indexes of the proposed factor model, construct reliabilities of the scales, and confirmatory factor loadings with *t*-values for each item are represented in Table 1. The indexes of the proposed factor model provide a good fit (Goodness-of-Fit Index [GFI] = .92, Adjusted Goodness-of-Fit Index [AGFI] = .90, root mean square error of approximation [RMSEA] = .042, Normed Fit Index [NFI] = .91, Non-Normed Fit Index [NNFI] = .95, Comparative Fit Index [CFI] = .96), showing unidimensionality of the scales (Steenkamp and Van Trijp 1991). Construct reliabilities of the scales were tested by means of Cronbach's alpha. Coefficients of all measures were equal to or greater than .80, which implies that reliability is deemed acceptable (Nunnally and Bernstein 1994).

In addition, within-method convergent validity was examined by investigating the significance and magnitude of the item loadings. All items loaded significantly on their respective construct (minimum *t*-value = 12.01) and had a standardized loading of at least .60. Next, discriminant validity was examined by testing whether pairs of constructs were correlated less than 1. Chi-square difference tests with 1 *df* were used to test for unity between pairs of constructs. All tests were significant at the .05 significance level.

The adoption level of IT was operationalized as a given employee's usage rate of standardized and customized IT applications. Each respondent was asked to indicate how many times he or she actually used a specific IT application on a 6-point scale, ranging from *never* (0) to *more times a day* (5). Specifically, standardized IT concerns the three different modules of the standard IT configuration (i.e., the task manager, promotions/selections, and order book modules). To properly assess the adoption level of customized IT, we inventoried the different additional software packages available within the bank (i.e., exchange rates analysis software, euro emulation software, and insurance decision support systems). In addition, a comprehensive list of 20 software applications was drafted, and individual team members were asked to indicate (a) which three IT applications they used most frequently and, consequently, (b) their usage rates for these applications. The group-level variable interteam network concerns a dummy indicating whether a team participated in a network of multiple teams. Finally, the demographic variables computer training, bank training, and age served as control variables when testing the hypotheses.

Table 2 indicates means, standard deviations, and individual-level as well as group-level correlations between antecedents and the adoption level of standardized and customized IT. It has been argued that corrections for individual-level measurement error should be made first, before comparing individual and aggregate-level correlations (Ostroff 1993). Therefore, we calculated individual-level correlations between the antecedents and IT adoption variables after increasing the reliability (= Cronbach's alpha) to .85 for those antecedent constructs that had lower reliabilities. Overall, the results indicate some increase of the individual-level correlations but do not imply major changes in the magnitude differences between individual-level and group-level correlations (Nunnally and Bernstein 1994).

Regarding the team outcome measures, team customer satisfaction ratings measured on a 7-point scale, ranging from *strongly dissatisfied* (1) to *strongly satisfied* (7), were collected from the bank's internal database. Similarly, we obtained a number of productivity metrics on five major service categories (i.e., savings accounts, investment funds, pension funds, euro obligations, long-term savings, and life insurances). Aforementioned service parameters indicate the average amount of services sold per team per year and reflect service productivity. Table 3 represents the overall means, standard deviations, and the correlations between the adoption level of standardized and customized IT and the outcome variables.

Data Analysis

To determine the occurrence of contextual influences in the antecedents of tolerance, usefulness, ease of use, innovativeness, and risk aversion, we examine within-group agreement and the ratio of within-group variance for these antecedents. Therefore, empirical justification of aggregation was required, which was tested by means of the $r_{WG(j)}$ coefficient, which is an indicator of within-group agreement (James, Demaree, and Wolf 1993), and the intraclass correlation (ICC) coefficient, which involves the ratio of within-group and between-groups variance. The $r_{WG(j)}$ coefficients of the antecedents (median values range from .81 and .96) indicate high consistency in ratings among employees within groups on these variables. In addition, we calculated the ICC[1] for each antecedent. Tolerance (ICC = .17), usefulness (ICC = .09), and risk aversion (ICC = .15) show relatively high ICC values, indicating that a substantial part of these antecedents concerns between-groups variance. Conversely, the ICCs of ease of use and innovativeness turn out to be zero, indicating that these antecedents operate exclusively at the individual level. Hence, based on the values of the $r_{WG(j)}$ coefficients and ICC coefficients, it can be concluded that for tolerance, usefulness, and risk aversion, data aggregation in order to examine their cross-level effects on IT adoption is justified. In contrast, from the zero ICC values, it appears that aggregate-level specifications of ease of use

1. Intraclass correlations were corrected for measurement error (cf. Van Yperen and Snijders 2000).

TABLE 1
Results of Confirmatory Factor Analyses

Measure	*Factor Loadings*	t-*Value*
Tolerance of self-management ($n = 5$, $\alpha = .81$)		
In our team we are		
1. encouraged to take initiative.	.60	12.21
2. allowed complete freedom in our work.	.76	16.14
3. permitted to use our own judgment in solving problems.	.70	14.50
4. allowed to do our work the way we think best.	.60	12.01
5. trusted to exercise good judgment.	.62	12.42
Usefulness ($n = 6$, $\alpha = .91$)		
1. Using IT enables me to accomplish tasks more quickly.	.77	17.89
2. Using IT improves my job performance.	.77	18.64
3. Using IT increases my productivity.	.81	19.83
4. Using IT enhances my effectiveness on the job.	.91	23.57
5. Using IT makes it easier to do my job.	.75	18.03
6. Overall, I find IT useful in my job.	.69	16.13
Ease of use ($n = 6$, $\alpha = .90$)		
1. IT provides me a helpful guidance in performing tasks.	.70	16.06
2. I find it easy to get IT to do what I want it to do.	.72	16.84
3. My interaction with IT is easy for me to understand.	.88	22.61
4. IT is flexible to interact with.	.78	18.85
5. It is easy for me to remember how to perform tasks using IT.	.76	18.16
6. Overall, I find IT easy to use.	.85	21.54
Innovativeness ($n = 5$, $\alpha = .83$)		
1. In general, you are among the first in your circle of friends to acquire new IT when it appears.	.64	14.12
2. You can usually figure out new high-tech products and services without help from others.	.65	14.30
3. You keep up with the latest technological developments in your areas of interest.	.81	18.10
4. You enjoy the challenge of figuring out high-tech gadgets.	.75	17.17
5. You find you have fewer problems than other people in making technology work for you.	.72	15.17
Risk aversion ($n = 4$, $\alpha = .80$)		
1. You do not consider it safe giving out a credit card number over a computer.	.64	13.38
2. You do not consider it safe to do any kind of financial business online.	.72	15.38
3. You worry that information you send over the Internet will be seen by other people.	.80	17.51
4. You do not feel confident doing business with a place that can only be reached online.	.66	13.93
Fit indexes		
Goodness-of-Fit Index (GFI) = .92		
Adjusted Goodness-of-Fit Index (AGFI) = .90		
Root mean square error of approximation (RMSEA) = .042		
Normed Fit Index (NFI) = .91		
Non-Normed Fit Index (NNFI) = .95		
Comparative Fit Index (CFI) = .96		

NOTE: All t-values are significant at $p < .05$. IT = information technology.

and innovativeness do not yield extra significant information, which implies that we have to reject Hypotheses 11c, 11d, 12c, and 12d a priori. As such, we did not specify cross-level relationships for ease of use and innovativeness.

To test Hypotheses 1, 2, 3, and 4, we analyzed the relationships between IT adoption level and service outcome parameters at the group level. As it was neither practically possible nor conceptually plausible to match employee perceptions with the selected productivity and customer criteria at the individual level, individual employees' IT adoption rates were aggregated to the group level of analysis to establish a match between the focal constructs and their consequences using the team as a unit of analysis. Moreover, it can be argued that it is more congruent to link the shared performance behaviors of team members to outcomes that are measured at the macro level (cf. Campion, Medsker, and Higgs 1993). As such, the hypothesized IT-adoption service performance relationships were tested at the group level.

A completely crossed two-by-two (higher-level/lower-level IT adoption by standardized/customized IT) quasi-experimental design was employed. In total, 157 teams were used for this analysis. Through median splitting the group mean adoption rates of standardized IT and customized IT, the teams in our study were divided into four con-

TABLE 2
Means, Standard Deviations, and Correlations of Variables

Variable	M	SD	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
1. Adoption level of standardized IT	2.85	0.92	—	–.09	.10	.09	.17**	–.07	.19**	.27***	—	—	.03
2. Adoption level of customized IT	2.71	2.37	–.02	—	–.12	.02	.05	.03	.18**	.14*	—	—	–.29***
3. Computer training	1.18	0.60[a]	.03	.02	—	–.03	–.30***	–.19**	.00	.02	—	—	–.04
4. Bank training	1.20	0.64[b]	.05	.03	–.01	—	.13*	.03	–.05	.10	—	—	–.07
5. Age	34.84	8.11	.17***	–.03	–.20***	.13***	—	.02	–.05	.14*	—	—	.12
6. Tolerance	5.69	0.87	.05	.11**	.03	.04	.04	—	–.07	.13*	—	—	.05
7. Interteam network	0.76	0.43	—	—	—	—	—	—	—	.18**	—	—	–.15*
8. Usefulness	5.82	0.92	.13***	.11**	–.06	.10**	.07	.11**	—	—	—	—	–.04
9. Ease of use	5.50	1.09	.15***	.05	–.01	.10**	–.08*	.06	—	.49***	—	—	—
10. Innovativeness	4.04	1.09	.11**	.09	.12***	.14***	–.17***	.05	—	.10**	.21***	—	—
11. Risk aversion	4.56	1.49	–.00	–.18***	–.06	–.02	.12**	–.01	—	–.04	–.14***	–.11**	—

NOTE: *N* = 434 respondents of 170 groups. Individual-level correlations are in the lower triangle, and group-level correlations are in the upper triangle.
a. Computer training consists of five categories ranging from *less than 10 days* (1) to *more than 40 days* (5).
b. Bank training consisted of five categories ranging from *less than 10 weeks* (1) to *more than 40 weeks* (6).
**p* < .10. ***p* < .05. ****p* < .001.

TABLE 3
Means, Standard Deviations, and Correlations of Variables

Variable	M	SD	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
1. Adoption level of standardized IT	2.86	0.63[a]	—								
2. Adoption level of customized IT	2.56	1.62[a]	–.07	—							
3. Customer satisfaction	5.68	0.42[a]	–.07	.23***	—						
4. Volume of savings accounts	53,415,992	37,109,753[b]	–.04	.20**	–.02	—					
5. Volume of investment funds	456,977,995	217,391,529[b]	.02	.18**	.05	.51***	—				
6. Volume of pension funds	63,494,250	27,890,212[b]	.06	.02	.03	.37***	.63***	—			
7. Volume of euro obligations	233,385,177	119,823,439[b]	.09	.13	–.03	.55***	.67***	.64***	—		
8. Volume of long-term savings	16,973,613	14,684,853[b]	.02	.04	–.04	.40***	.50***	.36***	.48***	—	
9. Bank training	1.21	.43[c]	.09	.02	.01	.18**	.12	.18**	.22***	.09	—

NOTE: *N* = 157 groups. IT = information technology.
a. Mean based on the group means.
b. Mean concerns an absolute number.
c. Bank training consists of five categories ranging from *less than 10 weeks* (1) to *more than 40 weeks* (6).
**p* < .10. ***p* < .05. ****p* < .001.

ditions: (a) lower level adoption of standardized IT / lower level adoption of customized IT (n = 47), (b) higher level adoption of standardized IT / lower level adoption of customized IT (n = 43) (c), lower- evel adoption of standardized IT / higher level adoption of customized IT (n = 32), and (d) higher level adoption of standardized IT / higher level adoption of customized IT (n = 35). Table 4 includes the means and standard deviations of the dependent variables for each separate condition.

Next, we conducted a multivariate analysis of covariance (MANCOVA) to test the main and interactive effects of the adoption level of standardized IT and the adoption level of customized IT on the specified dependent variables (i.e., customer satisfaction and productivity measures), where bank training served as a covariate to adjust for differences between the conditions. In addition, assumptions of MANCOVA were tested. First, histograms were inspected to check for violations of multivariate normality. The results showed only slight departures from normality. Second, the number of observations (i.e., teams) was about equal across the conditions, which implies that robustness of MANOVA could be assumed. Furthermore, homogeneity of regression slopes was checked to control for covariate-by-condition interactions. No significant interactions were found, which meant that the inclusion of the covariate bank training was allowed.

The MANCOVA results produced significant F-values for the main effect of the adoption level of customized IT, $F(6, 147) = 3.308$, $p = .004$, and the two-way interaction effect of the adoption level of standardized IT × customized IT, $F(6, 147) = 3.043$, $p = .008$, whereas no effect of the adoption level of standardized IT was found, $F(6, 147) = 1.642$, $p = .614$. These results are presented in Table 5.

Consequently, analyses of covariance (ANCOVAs) were conducted to investigate main and interaction effects for each dependent variable separately. Regarding the

TABLE 4
Means of Outcome Variables by Adoption Level and Type of IT

	Adoption Level of Standardized IT			*Adoption Level of Customized IT*		
Variable	M	SD[b]	*Adjusted Mean*[ab]	M	SD[b]	*Adjusted Mean*[ab]
Customer satisfaction						
Lower level condition	5.70	0.44	5.71	5.63	0.46	5.62
Higher level condition	5.67	0.40	5.68	5.76	0.34	5.77
Volume of savings accounts						
Lower level condition	56,704,849	38,548,473	59,096,397	46,483,933	29,659,939	46,073,646
Higher level condition	50,084,969	35,530,503	50,278,337	62,727,713	43,763,179	63,301,087
Volume of investment funds						
Lower level condition	4.65E + 08	219,474,894	4.77E + 08	4.13E + 08	179,764,433	4.11E + 08
Higher level condition	4.49E + 08	216,354,595	4.52E + 08	5.16E + 08	248,907,630	5.18E + 08
Volume of pension funds						
Lower level condition	62,221,723	26,531,922	62,114,467	61,282,099	23,453,849	60,917,130
Higher level condition	64,783,091	29,317,281	65,196,361	66,465,796	32,881,177	66,393,698
Volume of euro obligations						
Lower level condition	2.25E + 08	104,084,798	2.28E + 08	2.12E + 08	99,420,137	2.10E + 08
Higher level condition	2.42E + 08	134,043,677	2.45E + 08	2.62E + 08	138,359,419	2.62E + 08
Volume of long-term savings						
Lower level condition	16,140,512	13,305,293	16,509,129	15,816,292	13,329,208	15,801,280
Higher level condition	17,817,395	16,003,992	17,850,811	18,528,224	16,304,722	18,558,659

NOTE: IT = information technology.
a. Means are adjusted by the bank training covariate.
b. Means concern absolute numbers.

adoption level of standardized IT, on none of the specified dependent variables significant differences between higher level adoption groups and lower level groups were found, which implies that Hypotheses 1a and 2a can be rejected. With respect to the adoption level of customized IT, however, groups with higher adoption rates of customized IT appear to have significant higher customer satisfaction scores than the lower level groups, $F(1, 152) = 4.395$, $p = .038$.

Hence, Hypothesis 1b is supported. In addition, we also tested whether groups with a higher adoption level of customized IT are more productive. The higher level and lower adoption-level groups do not significantly differ in their service performance on pension funds and long-term savings, which implies that we need to reject Hypothesis 2b for those criteria. Conversely, higher adoption-level groups appear to have significantly higher volumes of savings accounts, $F(1, 152) = 8.910$, $p = .003$, investment funds, $F(1, 152) = 9.653$, $p = .002$, and euro obligations, $F(1, 152) = 7.958$, $p = .005$, than lower-level groups. Therefore, Hypothesis 2b is supported for those service categories.

In addition, no significant two-way interaction effect of the adoption level of standardized IT × the adoption level of customized IT was found in relation to customer satisfaction, which implies that Hypothesis 3 is rejected. Next, positive two-way interaction effects exist of the adoption level of standardized IT × the adoption level of customized IT with regard to pension funds, $F(6, 152) = 6.552$, $p = .014$, and euro obligations, $F(6, 152) = 6.229$, $p = .011$, indicating that those teams with higher adoption rates for both standardized and customized IT score significantly better than teams with lower adoption scores for one or both of these IT types, implying support for Hypothesis 4 with respect to these performance criteria.

Next, we tested the hypothesized antecedent-IT adoption-level relationships. Our conceptual framework of the antecedents of IT adoption includes variables at two levels of aggregation: the individual and the team level. Such data are designated as multilevel data. The levels are hierarchical, as employees are nested within groups. Conventional statistical techniques (e.g., ordinary regression analysis) ignore this hierarchy and may, therefore, yield incorrect estimates (Bryk and Raudenbush 1992). Conversely, hierarchical linear models, also called multilevel models, are an effective approach to deal with hierarchical data structures. To perform multilevel analysis, we used MLwiN (Rasbash et al. 2000), a software program that computes regression estimates by means of an iterative approach known as the Expectation-Maximization (EM) algorithm (Dempster, Laird, and Rubin 1977). In addition, Hypotheses 5-12 were tested through a multivariate hierarchical linear regression model using MLwiN software (Rasbash et al. 2000). Three hierarchical levels are specified, where Level 1 refers to the dependent variables indicated by $h = 1, \ldots . m$, Level 2 concerns the individual employees $i = 1, \ldots, n_j$ ($n_j = 434$ employees), and Level 3 involves the teams $j = 1, \ldots, N$ ($N = 170$ teams). Hence,

TABLE 5
MANCOVA and ANCOVA Results

MANCOVA	F*(6, 147)*[a]	p	*Power*
Factor			
Adoption level of standardized IT	1.642	.139	.614
Adoption level of customized IT	3.308***	.004	.927
Adoption level of standardized IT × Adoption level of customized IT	3.043***	.008	.901

ANCOVA	*Dependent Variable*	F*(1, 152)*[a]	P	*Power*
Factor				
Adoption level of standardized IT	Customer satisfaction	0.236	.628	.077
	Volume of savings accounts	2.326	.129	.329
	Volume of investment funds	0.559	.456	.115
	Volume of pension funds	0.495	.483	.108
	Volume of euro obligations	0.849	.358	.150
	Volume of long-term savings	0.316	.575	.086
Adoption level of customized IT	Customer satisfaction	4.395*	.038	.549
	Volume of savings accounts	8.910**	.003	.843
	Volume of investment funds	9.653**	.002	.870
	Volume of pension funds	1.568	.212	.238
	Volume of euro obligations	7.958**	.005	.800
	Volume of long-term savings	1.340	.249	.210
Adoption Level of Standardized IT × Adoption Level of Customized IT	Customer satisfaction	0.147	.702	.067
	Volume of savings accounts	0.085	.771	.060
	Volume of investment funds	0.003	.958	.050
	Volume of pension funds	6.552*	.011	.720
	Volume of euro obligations	6.229*	.014	.699
	Volume of long-term savings	0.000	.998	.050

NOTE: Results are controlled for the bank training covariate. IT = information technology.
a. *F* approximation.
*$p < .05$. **$p < .01$.

each measurement of a dependent variable on some group is represented by a separate line in the data matrix, containing the values $i, j, h, Y_{hij}, x_1 ij$, and those of other explanatory variables. To represent the multivariate regression model as a hierarchical linear model, the dummy variables d_1 to d_m are used to indicate the dependent variables (i.e., adoption level of standardized IT, adoption level customized IT). Dummy variable d_h is 1 or 0, depending on whether the data line indicates dependent variable Y_h or the other dependent variable. Next, the regression equation of the model can be expressed as follows:

$$\begin{aligned} Y_{hij} = {} & y_{00h} + y_{10h}\mathrm{COMP}_{ij} + y_{20h}\mathrm{BANK}_{ij} + \\ & y_{30h}\mathrm{AGE}_{ij} + y_{40h}\mathrm{TOL}_{ij} + y_{50h}\mathrm{USE}_{ij} + y_{60h}\mathrm{EASE}_{ij} + \\ & y_{70h}\mathrm{INNO}_{ij} + y_{80h}\mathrm{RISK}_{ij} + y_{01h}\mathrm{COMP}_{j} + y_{02h}\mathrm{BANK}_{j} + \\ & y_{03h}\mathrm{AGE}_{j} + y_{04h}\mathrm{TOL}_{j} + y_{05h}\mathrm{INTER}_{j} + y_{06h}\mathrm{USE}_{j} + \\ & y_{07h}\mathrm{RISK}_{j} + u_{0hj} + u_{4hj} + u_{5hj} + u_{6hj} + u_{7hj} + u_{8hj} + e_{hij}, \end{aligned} \tag{1}$$

where Y_{hij} is the assessment on the *h*th variable for individual *i* of group *j*; COMP, BANK, and AGE refer to employees' amount of computer training, bank training, and age, respectively; TOL, USE, EASE, INNO, RISK, and INTER are tolerance, usefulness, ease of use, innovativeness, risk aversion, and the team's participation into the interteam network, respectively.

The following analysis strategy was used. First of all, an intercept-only model was estimated. This is a model without predictors at any level, which represents the (unexplained) variation of the outcome variables (i.e., adoption level of standardized IT and adoption level of customized IT) at the individual and team level. In addition, individual-level and group-level relationships between the outcome variables were specified (Step 1). Next, the control variables (i.e., computer training, bank training, age) were included at both these levels of the model (Step 2).[2] Second, the specified individual-level antecedents were added to the model (Step 3).[3] Third, the group-level antecedents were incorporated into the model (Step 4). Multilevel models are considered as contextual models that may be subject to multicollinearity. Therefore, ordinary regression analyses were conducted to investigate multicollinearity of the model by means of the variance inflation factor (VIF). The VIFs of the specified independent variables were not higher than 1.62, indicat-

2. The control variables computer training, bank training, and age, as well as the antecedents tolerance, usefulness, and risk aversion, were specified both at the individual level (i.e., Level 2) and the group level (i.e., Level 3) of analysis. The Level 2 variables were group mean centered (i.e., individual score minus the group mean, which yields within-group deviation score) to distinguish the individual-level effect from the group-level effect (cf. Bryk and Raudenbush 1992).

3. Coefficients of the intercept and the individual-level antecedents were specified as random coefficients (i.e., the coefficients were allowed to vary across teams). Therefore, random parameters were specified at the group level. In theory, all effects of the coefficients could be specified as random effects. However, methodologically, this is not plausible because it has a negative impact on the model estimation procedure and the stability of the parameter estimates (Bryk and Raudenbush 1992).

ing that no multicollinearity problems were to be expected.

The results of the multilevel analysis are presented in Table 6. To begin with, the intercept-only model shows that team members' adoption level of customized IT (ICC = .10) and standardized IT (ICC = .13) encompasses a considerable part of between-groups variance. In addition, including control variables, individual-level antecedents and group-level antecedents (Step 2 through Step 4) all lead to significant improvements of the model fit.[4] Regarding the hypothesized relationships, strong positive effects exist of the individual-level tolerance on employee's adoption levels of standardized IT and customized IT, which implies that Hypotheses 5a and 5b are supported. Next, participation of the SMT in an interteam network positively affects team members' adoption level of standardized IT and customized IT, which means support for Hypotheses 6a and 6b. Furthermore, it appears that individual-level perceived usefulness is not significantly related to team members' adoption level of standardized IT, whereas it shows a significant positive relationship of the adoption level of customized IT. These findings imply that Hypothesis 7a is rejected, whereas Hypothesis 7b is supported. In addition, individual-level ease of use has a positive impact on employees' adoption level of standardized IT, whereas no significant relationship emerges with respect to team members' adoption level of customized IT. These findings indicate support for Hypothesis 8a, whereas Hypothesis 8b is rejected. In addition, a significant positive individual-level effect exists of innovation on employees' adoption level of standardized IT, whereas no significant linkage exists with regard to the adoption level of customized IT. This implies that Hypothesis 9a is supported, whereas Hypothesis 9b has to be rejected. Subsequently, individual-level risk aversion is not related to the adoption levels of standardized IT and customized IT, indicating that there is no support for Hypotheses 10a and 10b.

With respect to the cross-level hypotheses, we find that the (absolute) magnitudes of the between-groups coefficients are significantly greater compared with the within-group ones only for the effect of usefulness on employees' adoption level of standardized IT and for the effect of risk aversion on employees' adoption level of customized IT. This means that Hypotheses 11a, 11e, H12a, and H12b are rejected and that Hypotheses 11b and H12e are supported.

4. The predictive power of the different models can be compared by a likelihood ratio test (Bryk and Raudenbush 1992). Deviance is computed for each model, and the *difference* between the deviance statistics (Δ Deviance) has a chi-square distribution under H_0 that the extended model does not predict significantly better than the reduced model. Critical values of the chi-square statistic mean that the reduced model is too simple a description of the data.

Finally, the percentage of explained group-level variance is higher compared with individual-level variance for both the adoption level of standardized and customized IT. This signifies that the antecedents explain between-groups differences better than within-group differences of both dependent variables.

DISCUSSION

The objective of this article was to investigate antecedents and consequences of standardized as well as customized IT adoption in SMTs that operate in services, taking into account individual-level, group-level, and cross-level relationships. First, the linkage between IT adoption and service performance has been examined. A key finding is the fact that teams with higher levels of customized IT adoption display higher satisfaction ratings. This seems to be indicative of the fact that a higher adoption rate of customized service technology may be relevant to generate higher customer satisfaction scores. This confirms the findings of previous studies that report that technology may enhance the service delivery process (e.g., Bitner, Brown, and Meuter 2000). In addition to higher customer ratings, it appears that customized IT adoption positively affects a number of productivity parameters (i.e., savings accounts, investment funds, and euro obligations). Apparently, the relatively frequent use of customized IT by the SMT has an impact on both its effectiveness and efficiency. Interestingly, the adoption level of standardized or company-wide IT does not seem to have an impact on customer satisfaction and the various productivity parameters. It may be that the adoption of common technology systems involves a fundamental precondition enabling SMTs to provide customer service at a core level, although it is not directly responsible for excellence in service performance of the SMT. This notion is supported by the existence of interaction effects between customized and standardized IT adoption and two productivity parameters (i.e., pension funds, euro obligations), which implies that for these specific services, both types of technology complement each other to achieve a higher level of productivity.

Regarding the hypothesized antecedent-IT adoption relationships, our findings reveal a relationship between individual-level tolerance and the adoption levels of the different IT types, whereas no group-level effects of tolerance were found. These findings suggest that the tolerance-IT adoption linkage is primarily based on the social comparison process within the team. Employees who, in comparison with their colleagues within the team, are more positive about the freedom given to their team to perform the service task have higher adoption levels of stan-

TABLE 6
Results of Multilevel Analyses

	Dependent Variables							
	Adoption Level of Standardized IT (h = 1)				*Adoption Level of Customized IT (h = 2)*			
Model	*Coefficient*	(SE)[a]	*Δ Magnitude Coefficient*[b]		*Coefficient*	(SE)[a]	*Δ Magnitude Coefficient*[b]	
Intercept	–.203	(.720)			3.004	(1.953)		
Increase model fit[c] (Step 1)	$\chi^2(2) = .26$							
Control variables: Level 2[d]								
Computer training	–.070	(.089)			.209	(.221)		
Bank training	–.069	(.086)			.140	(.216)		
Age	.022	(.007)**			–.022	(.017)		
Control variables: Level 3[a]								
Computer training	.244	(.124)*	.310	(.152)*	–.458	(.340)	–.659	(.405)
Bank training	.085	(.108)	.149	(.139)	–.057	(.292)	–.146	(.367)
Age	.024	(.009)**	.003	(.011)	.014	(.025)	.037	(.029)
Increase model fit (Step 2)	$\chi^2(12) = 22.68$*							
Antecedents: Level 2[a]								
Tolerance	.146	(.066)*			.448	(.164)**		
Usefulness	–.074	(.045)			.195	(.112)*		
Ease of use	.110	(.045)**			–.165	(.116)		
Innovativeness	.092	(.036)**			.102	(.093)		
Risk aversion	–.003	(.026)			–.032	(.071)		
Increase model fit (Step 3)	$\chi^2(20) = 41.74$**							
Antecedents: Level 3[a]								
Interteam network	.226	(.106)*			.539	(.290)*		
Tolerance	–.071	(.073)	–.225	(.097)*	.047	(.201)	–.381	(.257)
Usefulness	.113	(.051)*	.172	(.065)**	.198	(.138)	.023	(.170)
Risk aversion	.023	(.030)	.027	(.040)	–.313	(.082)**	–.265	(.105)**
Increase model fit (Step	$\chi^2(8) = 34.86$**							
Residual between-groups covariance matrix[e]			1.		2.			
1. Adoption level of standardized IT			.031 (.039)					
2. Adoption level of customized IT			–.076 (.075)		.550 (.288)			
Residual within-group covariance matrix[f]			1.		2.			
1. Adoption level of standardized IT			.712 (.060)					
2. Adoption level of customized IT			–.029 (.108)		4.527 (.387)			
Explained Level 2 variance (%)		12.4			9.7			
Explained Level 3 variance (%)		19.4			12.3			

NOTE: Significance of coefficients is based on one-tailed tests. IT = information technology.
a. Standard errors are in parentheses.
b. Differences in magnitude between individual-level and group-level coefficients were tested by means of raw-score analyses and reflected by the presented group-level coefficients.
c. Increase in model fit when specifying individual-level and group-level relationships between the dependent variables.
d. Unstandardized regression coefficients.
e. var $(u_{hj}) = \tau_{hh}$, and cov $(u_{hj}, u_{h'}j) = \tau_{hh'}$.
f. var $(e_{hij}) = \sigma_{hh}$, and cov $(e_{hij}, e_{h'}ij) = e_{hh'}$.
*$p < .05$. **$p < .01$.

dardized and customized IT relative to their colleagues. These findings suggest that in comparison to a higher level self-management environment, the employee's own subjective feeling of freedom (that does not necessarily reflect an object reality of self-management) seems to have an even higher contribution to his or her adoption level of technology.

Furthermore, we found interteam network participation to have a positive impact on team members' adoption level of standardized IT as well as customized IT. These findings illustrate that in addition to a certain degree of autonomy for the team's members, teams as a whole have a need for a platform to agree on rules and regulations and to get feedback on how to deal with front-office service tasks and innovative back-office improvements. Consensus among teams on how to work together within a network and how to solve work problems promotes a mutual involvement with regard to adopting service technologies and enhances performance, as suggested by Ephross and Vassil (1988). To both enjoy the tolerance of freedom and the frame of reference consisting of organizational rules and regulations as well as of team-based norms, it seems important that there is adequate interteam communication, because SMTs are actively responsible for obtaining and sharing information with other departments in the organization in order to establish a good climate for service IT adoption.

In addition, we found no significant individual-level effect of usefulness on employees' adoption level of standardized IT, whereas a positive effect exists at the group level. In contrast to these findings, no significant group-level effect of usefulness was found on team members' level of adoption of customized IT, whereas a significant positive effect emerges at the individual level. These findings suggest that whether team members' adoption level of IT is a function of their own subjective perception of usefulness or a function of shared team member perceptions of usefulness depends on the specific type of IT (standardized versus customized). Apparently, the use of standard, company-wide systems is the decision of the team as a whole, which makes unique opinions of individual employees about the necessity to use this type of IT less relevant or even redundant. In comparison to standardized IT, individual employees have more freedom to decide themselves whether to adopt invaluable, but often expensive additional IT systems as instruments to support and to facilitate service activities.

Consequently, a positive effect exists of the individual-level predictor ease of use on team members' adoption of standardized IT, whereas no effect appears on customized IT. Because the usefulness of standardized IT applications concerns a matter of shared team member perceptions, individual employees will pay more critical attention to the user-friendliness of these already implemented technologies. In service situations that are atypical in nature, which cannot be managed by the existing standard IT applications, individual employees are forced to search for alternative IT systems to solve their problems. Consequently, the usefulness issue dominates the customized IT adoption process, as employees are mainly focused on extrinsic motivational aspects in terms of what should be done to obtain higher rewards.

A similar discrepancy in findings occurs between the different types of IT with respect to innovativeness and risk aversion. The individual-level predictor innovativeness has a positive relationship with the adoption level of standardized IT, although it is not related to the adoption level of customized IT. The other specified user characteristic risk aversion has a negative group-level effect on employees' adoption level of customized IT, whereas there is no individual-level effect. With respect to standardized IT, there appear no effects of risk aversion. Again, these differential findings between standardized and customized IT indicate that particular user characteristics to employees' adoption level of IT are related to particular types of IT. The positive effect of innovativeness on standardized IT adoption is in line with other studies reporting that people with more innovative attitudes have higher degrees of IT adoption (e.g., Schillewaert et al. 2000). Although the introduction of standard company-wide systems is largely predetermined by the top management, the team members' personal attitude toward these imposed IT innovations remains a crucial predictor of the actual usage rates. Surprisingly, innovativeness is not related to the adoption of customized IT. An explanation may be that shared risk perceptions are more relevant to customized IT adoption and may even overrule individual employees' personal attitudes of innovativeness in terms of importance. Employees primarily have to decide themselves whether to acquire or use those additional IT systems that are not well established in organizational IT practice. This heightened responsibility and authority, together with the lack of knowledge inherent to these forms of IT, enlarge the risks team members collectively experience when adopting customized IT.

THEORETICAL IMPLICATIONS

Limitations of our research may serve as anchor points for the theoretical implications of our study. To begin with, our results are based on service employees organized in teams of one financial services company. One key finding in this study is that the adoption level of customized IT has a positive impact on customer satisfaction and service productivity, whereas the adoption level of standardized IT appears less relevant. Service situations, however, vary widely across types of services and range from rather complex services that require a relatively high level of knowledge and skills (e.g., offering financial advice about mortgages, loans) to routine-based, repetitive activities in low-customer-contact service encounters (e.g., providing a menu in a fast-food restaurant). The implication is that different service activities require different types of IT. Therefore, an important question remains to what extent the role of standard and customized IT applications is contingent on the specific nature of service operations. Future research should examine the generalizability of our findings across different types of service organizations and types of service settings.

Second, different levels of analysis were considered in testing the hypothesized antecedent-IT adoption relationships. Although multilevel analysis accounts for clustering of the data, an important drawback, however, remains common method variance, which may have inflated the hypothesized relationships between the diverse scale constructs. For future research, we recommend the employment of multiple independent data sources.

Third, all relationships that were estimated in our study were cross-sectional in nature, which impedes making assumptions of causality. Longitudinal (e.g., panel) research is required to perform cross-lagged analyses in order to demonstrate causality of the hypothesized relationships and to explore the occurrence of reciprocal effects (cf. Schneider, White, and Paul 1998).

Fourth, in this study, we used a multilevel approach to investigate the IT adoption process. Our results show that the simultaneous comparison of individual-level and group-level effects of antecedents on IT adoption provides additional insight into the processes that lead to higher adoption rates. Future studies on IT practice in work groups need to employ such a multilevel perspective to determine the impact of team members' subjective perception and personal attitudes, as well as the impact of interpersonal processes (e.g., Leonard-Barton and Deschamps 1988). Specifically, additional conceptual work is needed to properly address the underlying theoretical mechanisms that cause these magnitude differences between individual-level and group-level relationships. Particularly, additional theoretical work is required on impact of interpersonal processes among team members on individual employees' IT-related behaviors.

Finally, it has become clear from our study that predictor-performance relationships appear to differ with regard to different types of technologies. Future research may extend the present study and compare other types of technologies to determine whether the differences that were found are related to distinct underlying structural patterns of the innovations.

MANAGERIAL IMPLICATIONS

Several managerial implications with regard to the functioning of contact employees in SMTs follow from our study. First, it has been demonstrated that the adoption level of customized IT rather than of standardized IT has an impact on service performance in terms of customer satisfaction and service productivity. From a managerial standpoint, it seems worthwhile to increase the adoption level of IT applications that are intended to support specific service operations of employees in SMTs. When an SMT opts to use new IT applications for a given service procedure, the customer's viewpoint needs explicitly to be taken into account. To encourage the use of customer service-driven IT applications, firm management should encourage SMTs to employ service quality and productivity standards to evaluate newly developed IT applications.

The differential effects of antecedents on employees' adoption levels of standardized and customized IT suggest that managers need to discriminate between types of technology and fine-tune their IT adoption strategy to the specific type of IT concerned. The findings of our study suggest a number of points to focus on, especially with respect to customized IT. In this study, it is found that shared employees' perceptions of risk were strongly linked to the adoption rate of customized IT. Thus, it seems especially relevant to pay attention to the influence of similar short introductions of newly developed IT applications. Designers should strive for simplified technologies aimed at the IT competence of employees. This can be achieved by organizing communal meetings where designers talk with the team as a whole. Also, managers should give team members room to experiment to become familiar with the nature of new techniques by scheduling in IT trial-and-error hours and to exchange their IT experiences to develop a positive collective sense of new IT applications. In addition, individual employees' unique perceptions of the IT's usefulness were significantly linked to their own adoption rate of customized IT, which implies that designers have an important job to personally persuade employees of the necessity to acquire IT by showing the clear-cut advantages of new systems over the existing ones.

In addition, individual-level tolerance appears to be relevant to customized IT adoption and suggests the relevance to pay attention to the personal perceptions of freedom of the potential individual users. Therefore, in encouraging self-management, managers need to intrinsically motivate people by shifting their attention to natural (intrinsic) rewards that are built into the task rather than to externally administer rewards in order to get people more involved with their job. The current knowledge requiring IT-supported service activities involves ample intrinsically motivating aspects. IT-supported service activities often concern meaningful, complete entities, typically having an identifiable beginning (e.g., starting and shutting off a financial consulting program) (Janz et al. 1997). Managers should, therefore, leave more decision room for SMT workers to decide what specific activities the different employees within the SMT want to do and in what way. Finally, IT use in itself may act as a way to further mobilize this intrinsic motivation and to reinforce self-management.

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